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10/667,549	09/22/2003	Udayan Rajendra Kanade	COT-002	9982

7590
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EXAMINER

WILSER, MICHAEL P

ART UNIT	PAPER NUMBER
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2109

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/667,549	Applicant(s) KANADE, UDAYAN RAJENDRA	
	Examiner Michael Wilser	Art Unit 2109	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-8 and 13-23 is/are rejected.
- 7) ☐ Claim(s) 3,4 and 9-12 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>9/22/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is in response to the original filing of September 22, 2003.

Claims 1-23 are pending and have been considered below.

Specification

2. The disclosure is objected to because of the following informalities: the examiner notes the use of acronyms (e.g. DMA, etc.) throughout the specification without first including a description in plain text, as required.

3. On page 8, line 24 of the specification the applicant states "programmed uses a series". This appears to be a typographical error and the specification should have read "programmed using a series".

4. On page 16, line 33 of the specification the applicant states "thread which acts a consumer". This appears to be a typographical error and the specification should have read "thread which acts as a consumer".

5. On page 11, lines 22-23 of the specification the applicant refers to the itinerary building service 112. However, on page 9, line 6 the applicant refers to the reference number 112 as referring to the processor. Additionally, on page 11, line 18 the applicant refers to the above mentioned itinerary building service as reference character 214. For purpose of examination the examiner is interpreting the applicant to have meant to use reference character 214 on line 23 of page 11.

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6. On page 12, lines 18-19 of the specification the applicant refers to the itinerary running service 114. However, on page 9, line 16 the applicant refers to the reference number 114 as referring to the scheduler. Additionally, on page 9, line 22 the applicant refers to the above mentioned itinerary running service as reference character 118. For purpose of examination the examiner is interpreting the applicant to have meant to use reference character 118 on line 19 of page 12.

7. On page 18, line 8 of the specification the applicant refers to the itinerary building service 112. However, on page 9, line 6 the applicant refers to the reference number 112 as referring to the processor. Additionally, on page 11, line 18 the applicant refers to the above mentioned itinerary building service as reference character 214. For purpose of examination the examiner is interpreting the applicant to have meant to use reference character 214 on line 8 of page 18.

8. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: Claims 22-23 are directed toward a computer program product. However, in the specification the applicant never states that the invention includes a computer program product and also fails to define what is included or excluded by the term computer program product.

Appropriate correction is required.

Claim Objections

9. Claim 4 is objected to because of the following informalities: On line 4 the applicant states "stall further execution". This appears to be a typographical error and should have read "stall during execution" and will be interpreted as such for the purposes of examination. Appropriate correction is required.

Claim Rejections - 35 USC § 112

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

12. Claim 11 recites the limitation "the return value" in line 6. There is insufficient antecedent basis for this limitation in the claim. Claim 11 is dependent on Claims 9 which is dependent on Claim 5, no where in the claim dependency is a return value mentioned

13. Examiner's Note. The Applicant appears to be attempting to invoke 35 U.S.C. 112 6th paragraph in Claims 16 and 20-23 by using "means-plus-function" language. However, the Examiner notes that the only "means" for performing these cited functions in the specification appears to be computer program modules. While the claims pass the first test of the three-prong test used to determine invocation of paragraph 6, since no other specific structural limitations are disclosed in the specification, the claims do not meet the other tests of the

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three-prong test. Therefore, 35 U.S.C. 112 6th paragraph has not been invoked when considering these claims below.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

15. Claims 1-2 are rejected under 35 U.S.C. 102(e) as being anticipated by Ignatius et al. (US 7,209,972).

Claim 1: Ignatius discloses a method in a multithreaded system comprising:

- a. writing a plurality of errands (logical tasks) (column 3, lines 47-56);
- b. the logical tasks performing specific tasks of a threads functionality (column 1, lines 24-28 & column 4, lines 4-7);
- c. forming one or more itineraries (schedules) corresponding to the threads (column 4, lines 8-24); and
- d. the schedules controlling execution of the logical tasks in the desired manner (column 4, lines 8-24).

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Claim 2: Ignatius discloses a method as in Claim 1 above, and further discloses that the schedule is shared by multiple threads within the multithreaded system.

16. Claims 5-8, 13-15, and 22-23 are rejected under 35 U.S.C. 102(e) as being anticipated by Harres (US 6,886,081).

Claim 5: Harres discloses a method in a multithreaded system comprising:

- a. compiling application code (column 1, lines 9-14);
- b. scheduling a plurality of threads for execution (column 1, lines 9-14);
- c. executing threads using normal thread constructs (column 1, lines 33-54);
- d. thread execution in accordance with standard thread methodology (column 1, lines 33-54);
- e. executing itineraries (schedules) (column 4, lines 60-67 & column 5, lines 1-13);
- f. schedule execution is mode of scheduling threads to run according to the determined schedule (column 4, lines 60-67 & column 5, lines 1-13).
- g. schedules carried out using a kernel stack (memory stack) (column 4, lines 60-67 & column 5, lines 1-13);
- h. exiting scheduling mode when scheduling is completed (column 4, lines 60-67 & column 5, lines 1-13); and
- i. threads continue to run according to a normal thread execution process (column 1, lines 33-54).

Claim 6: Harres discloses a method as in Claim 5 above and further discloses that the scheduled execution is carried out after preempting a thread running under normal execution (column 1, lines 55-67 & column 2, lines 1-5).

Claim 7: Harres discloses a method as in Claim 5 above, and further discloses:

- a. sequentially queuing a plurality of threads for resource allocation based on predefined criteria (column 1, lines 55-67 & column 2, lines 1-5);

- b. queuing done for allocation of a resource to a thread (column 1, lines 55-67 & column 2, lines 1-5); and

- c. allocating a resource to a thread according to the queue maintained for the resource (column 1, lines 55-67 & column 2, lines 1-5).

Claim 8: Harres discloses of a method as in Claim 7 above, and further discloses:

- a. loading the thread context (column 2, lines 31-43);

- b. thread context being information required for execution of the thread (column 2, lines 31-43);

- c. executing thread specific logic (column 2, lines 31-43);

- d. preempting thread in response to a request for thread preemption (column 1, lines 55-67 & column 2, lines 1-5);

- e. thread preemption done after storing thread context in memory stack associated with thread (column 2, lines 31-43); and

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f. storing a pointer to the stack in the thread (column 3, lines 3-21).

Claim 13: Harres discloses a system for multithreading comprising:

- a. compiler for compiling (column 1, lines 9-14);
- b. memory storing information related to the threads (column 1, lines 17-32);
- c. thread stacks with information for running threads (column 4, lines 60-67 & column 5, lines 1-13);
- d. kernel stack (memory stack) used for itineraries (schedules) (column 4, lines 60-67 & column 5, lines 1-13);
- e. processor for processing threads (column 1, lines 17-32); and
- f. operating system for scheduling and managing the plurality of threads (column 2, lines 3-22).

Claim 14: Harres discloses a system as in Claim 13 above, and further discloses that the system has multiple processors and stacks (column 1, lines 33-54).

Claim 15: Harres discloses a system as in Claim 13 above, and further discloses of the system comprising:

- a. a scheduler (column 2, lines 3-22);
- b. a standard thread running service (column 1, lines 33-54); and
- c. an itinerary (schedule) running service (column 1, lines 33-54).

Claim 22: Harres discloses a computer program product for multithreaded system comprising:

- a. instructions for compiling code (column 1, lines 9-14);
- b. instructions for scheduling a plurality of threads (column 1, lines 9-14);

and

- c. instructions for executing threads using standard thread executing and minimizing thread switching (column 4, lines 60-67 & column 5, lines 1-13).

Claim 23: Harres discloses a computer program product as in Claim 22 above, and further discloses:

- a. instructions for executing thread running standard thread constructs (column 1, lines 33-54);
- b. instructions for itinerary (schedule) execution carried out after preempting thread running in accordance to normal thread methodology (column 1, lines 55-67 & column 2, lines 1-5).
- c. instructions for exiting schedule mode when tasks of schedule are complete (column 4, lines 60-67 & column 5, lines 1-13); and
- d. instructions for running thread according to normal execution after leaving schedule (column 1, lines 33-54).

17. Claims 20-21 are rejected under 35 U.S.C. 102(e) as being anticipated by Albuz et al. (US 7,203,823).

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Claim 20: Albuz discloses an apparatus for scheduling the running services of a thread comprising:

- a. standard preemptive services (column 5, lines 30-62);
 - b. standard non-preemptive services (column 5, lines 30-62);
 - c. itinerary (schedule) building service (column 7, lines 66-67 & column 8, lines 1-24);
 - d. executing errands (mixed threads) sequentially (column 9, lines 26-61);
- and
- e. blocking the schedule of tasks when one of the mixed threads blocks (column 5, lines 30-62).

Claim 21: Albuz discloses an apparatus as in Claim 20 above, and further discloses unblocking a schedule when the mixed thread returns to processing that caused the block (column 5, lines 30-62).

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. Claims 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harres (US 6,886,081) in view of Albuz et al. (US 7,203,823).

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Claim 16: Harres discloses a system as in Claim 15 above and further discloses:

a. ready queue for holding threads ready for execution (column 5, lines 40-49); and

b. scheduling a plurality of threads based on criteria (column 2, lines 3-22).

However, Harres does not explicitly disclose prioritizing the threads based on pre-defined criteria. However, Albuz discloses a similar system for multithreading in which the threads are prioritized based on pre-defined criteria (column 1, lines 42-54). Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to prioritize the threads based on pre-defined criteria in Harres. One would have been motivated to prioritize the threads based on criteria so that when a new thread enters the processor it could be determined whether that thread needs the processor before another thread that is trying to execute.

Claim 17: Harres and Albuz disclose a system as in Claim 16 above, and Albuz further discloses maintaining two separate queues for the normal threads and the schedule threads (column 7, lines 66-67 & column 8, lines 1-24). Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to use two queues in Harres. One would have been motivated to use two queues so that the threads that are supposed to run in each mode are able

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to be scheduled and run in the proper order, otherwise there would be more idle time and context switching.

Claim 18: Harres discloses a system as in Claim 15 above, but does not explicitly disclose a preemption service having both standard preemptive and non-preemptive services. However, Albuz discloses a similar system in that does have a preemptive service with standard preemptive and non-preemptive services (column 5, lines 30-62). Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to have standard preemption services in Harres. One would have been motivated to have standard preemptive services so that tasks that need to be preempted can have their information properly saved and stored, as is common in the art, as well as not interrupting threads that do not need preemptive service.

Claim 19: Harres discloses a system as in Claim 15 above, and further discloses the system having an itinerary (schedule) building service (column 1, lines 55-67 & column 2, lines 1-5). However Harres does not explicitly disclose a preemption service having both standard preemptive and non-preemptive services. However, Albuz discloses a similar system in that does have a preemptive service with standard preemptive and non-preemptive services (column 5, lines 30-62). Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to have standard preemption services in Harres. One would have been motivated to have standard preemptive services so that tasks that

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need to be preempted can have their information properly saved and stored, as is common in the art, as well as not interrupting threads that do not need preemptive service.

Allowable Subject Matter

20. Claims 3-4 and 9-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 3-4: Harres discloses storing information regarding threads (column 2, lines 31-43) and storing the sequence in which the threads are to be executed (column 1, lines 55-67 & column 2, lines 105). However, neither Harres nor Albuz disclose that the information is stored in the form of pointers to an "errand function list". The prior art of Harres and Albuz both show storing the state information of the thread that has been preempted in a memory location. The errand function pointers, errand function list, and errand data list comprise a set of features using pointers and threads not disclosed in the prior art. Claim 4 inherits all of the features of Claim 3 and therefore cannot be rejected with prior art teachings.

Claims 9-12: Harres and Albuz disclose executing tasks corresponding to the schedule for those tasks (column 4, lines 60-67 & column 5 lines 1-13 and column 9, lines 26-61 respectively). However, the prior art of record does not

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disclose setting up an errand state variable and errand function list as in Claim 9. Harres shows a similar method done in memory but does not use a kernel stack that later becomes an execution stack. Further neither reference teaches forming pointers to access the errand data lists during execution.

Conclusion

21. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Dice (US 6,697,834) Mutual Exclusion System and Method for Restarting Critical Sections of Code when Preempted During a Critical Section.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Wilser whose telephone number is (571) 270-1689. The examiner can normally be reached on Mon-Fri 7:30-5:00 EST (Alt Fridays Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James Myhre can be reached on (571) 270-1065. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



MPW
May 16, 2007



James Myhre
Supervisory Patent Examiner